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SOME INFLUENCES OF LOCATION UPON LIGHT TRAP CATCHES.*

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Since 1923 the writer has operated a light trap at Bozeman for the purpose of recording fauna and seasonal fluctuations in the population of Phalaenid moths. This trap, known as the "Field Trap," is located on the east edge of a large agricultural experimental field which is cut into many plots. The trap is about 100 yards west of the nearest building, and is on a pole with the light about six feet above the ground. This trap is rather inconvenient to operate in wet weather, so, in 1927, Ross Hutchins, then a student assistant, set up a make-shift trap in a window of our laboratory on the third floor of the Biology Building. This was operated for about three months, and the catches proved so interesting that a permanent "Building Trap" was installed in April, 1928, and has now been operated for two complete seasons. Both traps are modifications of the type previously described,⁽¹⁾ in which the large bucket is replaced by a wide-mouth fruit jar, and use 75-watt 110-volt bulbs. The building trap has a large wall as a reflector, which the field trap lacks, and is close enough to the top of the building to be protected somewhat in bad weather by the large, overhanging eaves. In both seasons the traps were operated from the first warm weather in the spring until the moths practically ceased to fly in the fall.

TABLE I.
GENERAL STATISTICS OF TRAPPING

	1928	1929
Dates of operation	Field May 4-Sept. 21 Building Mar. 21-Oct. 30	Apr. 26-Sept. 13 Apr. 26-Sept. 17
Nights operated	Field 103 Building 145	71 116
Total Moths captured	Field 3278 Building 3295	2666 4213
Moths per night	Field 31.80 Building 22.72	37.54 36.38
Species and varieties recorded	In both traps 213 In field trap 129 In building trap 186	205 120 194
Species caught only in	Field trap 27 Building trap 84	11 85
Species per collection	Field 8.72 Building 9.23	8.40 11.64

*—Contribution from the Entomology Department, Montana Agricultural Experiment Station.
(1).—Can. ent. LVIII: 105-108.

The captures made in the two traps were very different, and I wish to present a rather brief analysis of these differences. Some general statistics of trap operation are given in Table I.

A study of this table shows that the building trap was operated about 40 more nights per season than the field trap. A large part of this difference is due to the inconvenience of operating the field trap in wet weather, mentioned above. In addition to this, the building trap had a longer season than the field trap in 1928, making nine catches early in the spring and ten late in the fall, when the field trap was not in operation. Excluding these 19 nights, the building trap caught 25.56 moths per night in 1928 instead of 22.72 as given in the table.

The field trap caught a somewhat larger number of moths per night, due largely to the fact that it was not operated on so many unfavorable nights as the building trap.

From a qualitative standpoint the building trap was vastly superior. In 1928, 87.4% of the total species and varieties captured in both traps were recorded in this trap, and this figure rose to 94.5% in 1929. The building trap caught 84 species in 1928 and 85 species in 1929 that were not recorded in the field trap. Further, in both seasons the building trap caught a larger number of species per collection than the field trap.

A further analysis of these catches shows some more points of interest. From the detailed records all species were segregated of which ten or more moths were captured in both traps in one season. There were 78 such species, of which 46 came in larger numbers to the building trap and 16 to the field trap while 16 were neutral. A second segregation of species of which twenty or more captures were made per season yielded 56 species, among which were 30 that came more commonly to the building trap and 13 to the field trap, while 13 were neutral. This list of 56 species is appended.

Attracted to Building Trap

Euxoa quadridentata G. & R.

" *plagigera* Morr.

" *perolivalis* Sm.

" *infracta* Morr.

" *sponsa* Sm.

" *messoria* Harr.

" *tessellata* Harr.

" *redimicula* Morr.

" *costata idahoensis* Grt.

" *ochrogaster* Guen.

Chorizagrotis auxiliaris Grt.

" *balanitis* Grt.

Feltia vancouverensis Grt.

Barathra configurata Wlk.

Scotogramma trifolii Rott.

Polia farnhami Grt.

" *meodana* Sm.

" *lilacina* Harv.

" *olivacea* Morr.

Orthosia hibisci Guen.

Cirphis anteroclara Sm.

Cucullia intermedia Speyer.

Litholomia napaea Morr.

Septis alia Guen.

" *parcata* Sm.

Agroperina lateritia Hufn.

Caradrina extima Wlk.

Gortyna pallescens Sm.

Autographa pseudogamma Gr.

" *californica* Speyer.

Neutral

Euxoa laetificans Sm.

" *declarata* Wlk.

" *tristicula* Morr.

Feltia ducens Wlk.

" *volubilis* Harv.

Agrotis smithi Snell. (=baja auct.)

Epipsilia littoralis Pack.

Polia vicina Grt.
Eriopyga oviduca Guen.
Cirphis insueta megadia Sm.
Trachea indirecta Grt.
Agroperina cogitata Sm.
Sidemia devastator Brace.

*Attracted to
 Field Trap*

Euxoa ridingsiana Grt.
 " *intrita* Morr.

Euxoa rena cervinea Sm.
 " *divergens* Wlk.
Protagrotis niveivenosa Grt.
Polia atlantica Grt.
 " *renigera* Steph.
 " *stricta tenisca* Sm.
 " *lorea* Guen.
Nephelodes tertialis Sm.
Leucania minorata Sm.
Xylina nupera Lint.
Agroperina lineosa Sm.

In this list, which is arranged systematically, the twenty species in italics are of economic importance in this region. Of these twenty, ten came more commonly to the building light, and five were neutral, leaving five that came in larger numbers to the field light. An interesting feature of this list is that six of the ten species coming to the building trap are generally regarded as very slightly attracted to lights on the ground. This was shown definitely for *auxiliaris* and *messoria* in an earlier paper.⁽²⁾ These six species are:

Euxoa messoria, *Euxoa tessellata*, *Euxoa ochrogaster*, *Chorizagrotis auxiliaris*, *Barathra configurata*, *Autographa californica*.

These six species are of very great economic importance and it is a matter of great importance to so place light traps as to obtain maximum numbers of them in order to secure reliable data upon their relative abundance in different seasons.

Another interesting feature of these catches lies in the fact that the building trap seemed to attract many species that do not breed in the immediate vicinity, but which are quite common in the lower end of the Gallatin Valley, about twenty miles away. Such species as *Euxoa plagigera*, *E. perolivalis*, *E. quadridentata*, and *E. redimicula* are very common in the dry land regions of the State, but quite rare in irrigated sections. On the other hand, none of the species that came more commonly to the field trap are especially common in dry land regions, but are quite common locally. This would indicate that the building trap was in a much better position to capture migrating moths than the field trap, while the latter seemed to attract more local species.

Because of the above considerations, we have definitely required that light traps in other parts of the State (of which there were four in 1929) be placed on buildings, as high up as possible.

SUMMARY

Two similar light traps have been operated concurrently at Bozeman during two seasons. One of these traps is in a field, while the other is in a third-story window of a building.

Weather conditions caused the building trap to be operated about forty more nights per season than the other trap. The field trap caught a slightly greater number of moths per night, but not nearly so many species, either per collection or for the season. Considering only the most abundant species, the build-

(2).—Can. ent.: LX: 103-109.

ing trap caught larger numbers of more than half of them. Out of twenty species of economic importance, ten came more freely to the building light and five were neutral.

A general comparison of the catches shows that the building trap attracted many species of moths whose breeding grounds are at a distance, while the field trap attracted mainly those breeding locally.

From all of these standpoints, the superiority of the building trap was very marked.

BIOLOGIC NOTES ON *MICRORHOPALA VITTATA* FABR.
(COLEOPTERA: CHRYSOMELIDAE).*

BY GEORGE O. HENDRICKSON,

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Late in the summer of 1926, several adults of the beetle (*Microrhopala vittata* Fabr.) were found in the blistered portions of leaves of the compass plant (*Silphium laciniatum* L.). The insect is black with head and thorax red and with red stripes on the second costa and at the outer margin of each elytron. It is subdepressed and about 6 mm. long.

Incited to learn more about the biology of this insect, the author began further observations in the spring of 1927 at a small tract of prairie near Ames, Iowa. There a large family of *S. laciniatum*, a perennial, occurred in an *Andropogon furcatus* associes. On May 6 three adults were dug from among the bases of old stalks about four inches below the surface of the ground. Because the field was mown the previous summer and the hay removed, it is assumed that these beetles had wintered over in the adult stage at the bases of the old plants. On May 7, a female was observed in oviposition on the upper surface near the tip of a basal leaf about eight inches tall. After depositing each egg, she covered it with feces which soon turned blackish in color. Seven eggs were laid and covered within an area of less than one square inch on this leaf. The field was visited each other day, and on May 28 the small larvae had hatched as the first signs of their feeding were seen in the mesophyll beneath the hatching place. Following the mining of the leaf, the upper and the lower epidermis of the leaf became brownish and bulged out slightly. From observations of ink marks placed on the upper epidermis of the leaf, it appeared on June 23 that the larvae had stopped their feeding. Then the blistered portion of the leaf was brought indoors and opened at one end. Five pupae were seen in the chamber. Three adults appeared on June 29, and two more June 30. A pair mated and a few uncovered eggs were laid by the female July 2.

Other larvae were seen in leaves until late in August when the field was mown. Hence at least two generations are probable under normal conditions. Because the deeply pinnatifid leaves of this plant are frequently turned away from the sun at noon to point north and south, the larvae in their chambers are quite well protected from the direct and hottest rays. The larvae were frequently seen to be near the center of the chamber during the warmest hours. At this portion the upper and the lower epidermis had bulged out so that larvae could have the protection of a layer of air above them while at the edges of the

*—Contribution from the Department of Zoology and Entomology, Iowa State College.
Iowa State College, Ames, Iowa.

chamber the two surfaces were closer together and the epidermis pressed them from above and below. The pupae by arching and wriggling were able to move around the chamber. Adult beetles were found on cool days in the axils of the upper leaves, and during the hottest hours of the warmer days they were often seen at the bases of the plant just below the surface of the ground. The adults fed upon the leaves of the compass plant by gnawing at the edges or the surfaces. If a plant was brushed or shaken, the beetles frequently fell to the ground or into the axils of the leaves where they retreated from sight.

A REVIEW OF THE GENUS *PALMACORIXA* ABBOTT (HEMIP.,
CORIXIDAE).*

BY G. STUART WALLEY,
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The genus *Palmacorixa* was erected by Abbott (Ent. News, XXIII, 337, 1912) for a single species, *Palmacorixa gillettii* Abb. described from three males and three females collected at Fort Collins, Colorado, during May and June, by Professor C. P. Gillette. Subsequently (Can. Ent., XLV, 113, 1913) Dr. Abbott described a second species, *Palmacorixa buenoi* Abb. from specimens taken at White Plains, New York, during August and September, by Mr. J. R. de la Torre-Bueno. A third species, *Palmacorixa mexicana* Hungfd. has been described by Dr. H. B. Hungerford (Pan-Pac. Ent., IV, 94, 1927) from a pair of specimens collected in the Xochimilco Sea, Mexico, by Dr. A. Dampf.

Through the kindness of Mr. J. R. de la Torre-Bueno the writer has had the opportunity of studying specimens from the type series of Abbott's species as well as additional material of *P. buenoi* from the type locality. There is also at hand a large series of *Palmacorixa* specimens from various Ontario and Quebec localities. This material in addition to containing numerous examples of both *P. gillettii* and *P. buenoi* has been found to contain a well marked variety of the former and an undescribed species closely related to *buenoi*. The following notes and descriptions are based on a study of the above mentioned material.

The genus *Palmacorixa* was originally defined by Abbott as follows:

"Elongate with vermiculate semi-obselete markings. Male palae thin, platelike, obliquely inserted, the height about one-half the greatest length, the upper margin parabolic, the stridulating "pegs" in two rows and reduced to the lower proximal corner of the inner surface. Large stridular area on femur. Female palae short cultrate, femur also apparently with a stridular area. No terminal palar spine in either sex. Male vertex tumid, face flat, hardly foveate, female face convex. Metathoracic wings aborted in both sexes. Male asymmetry and strigil dextral; fifth tergite entire, sixth divided. Perhaps related to *Arctocorisa* Walleng. but differs markedly in several particulars from any other genus hitherto described."

The single species described as *Palmacorixa gillettii* Abb. becomes the genotype. In 1913, when *P. buenoi* was described, Abbott revised his generic diagnosis to include this species, as follows:

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

"Elongate, tegmina tapered posteriorly, with vermiculate semi-obsolete markings. Male palae thin, plate-like, pegs variable. Large stridular area on femur. Metathoracic wings aborted in both sexes. Male asymmetry and strigil dextral; fifth tergite entire, sixth divided."

The generic characters are further discussed by Dr. H. B. Hungerford (Pan-Pac. Ent., IV, 94, 1927) who states "The genus is valid, but the author's characterization of it a little unfortunate, because the metathoracic wings are not aborted in both sexes and his description of the pala of the male is specific and not generic."

The writer has spent some time studying the species at hand with the object of disclosing further generic characters which might prove of value in distinguishing this genus from its allies. In addition to the characters mentioned by previous authors, the antennal structure, form of head and pronotum, shape of lateral lobe of the prothorax, the metaxyphus, the configuration of the abdominal tergites and the form of the male genitalia have all contributed characters. The genus is therefore redefined as follows:

Species ranging in length 4.5 to 7 mm. Form of body elongate, slender, with somewhat the aspect of a large *Trichocorixa*. Head with front margin of vertex roundly produced so that margin (from above) is not continuous with margins of compound eyes; lateral angles of head prolonged posteriorly so that head embraces pronotum and lateral angles attain lateral limits of posterior margin of pronotum. Vertex with a low median longitudinal carina. Antennae four jointed, first two joints rather short, third joint longest thickest and slightly bent, fourth joint very small scarcely one-fourth length of third joint. Pronotum proportionately shorter than is typical of *Arctocorixa*, finely rastrate. Lateral lobe of prothorax longer than broad, upper margin curved so that lobe becomes wider toward base, lower margin straight. Lateral margins of pronotum very short or wanting. Metaxyphus short, sub-triangular. Male pala rather thin, sometimes plate-like expanded; femur with a large stridular area. Tegmina slender, not distinctly rastrate, tapered posteriorly only very slightly overlapping at tips, membrane area very small, narrow and not distinctly defined from corium. Hindwings usually aborted and non-functional, sometimes fully developed. Male with fourth abdominal tergite with posterior margin produced to form two broad hair fringed lobes on either side a deep median incision, the right lobe slightly larger; fifth tergite partly covered by lobes of fourth; sixth tergite entire; seventh tergite just to right of middle with a pencil of long hairs and a small curved dextral chitinous hook. Strigil of male on right side, small, quadrate-ovate with four to six transverse striae. Asymmetry of male sternites on right side. Ninth or genital segment similar in form to *Arctocorixa*, the right clasper of male curved, broad at base, thence narrowed to form a neck like portion which ends in a broader flattened truncate or subtruncate blade.

General color brown, tegmina with vermiculate blackish markings which may be semi-obsolete or may be massed to form blotches. Pronotum crossed by 5-8 rather narrow blackish bars which are often furcate or abbreviated laterally.

As in other genera of Corixidae the most accessible characters for the separation of species are found in the male sexual and secondary sexual characters.

The following key is therefore based on males. The characters given for *P. mexicana* are obtained from the original description of that species.

KEY TO SPECIES

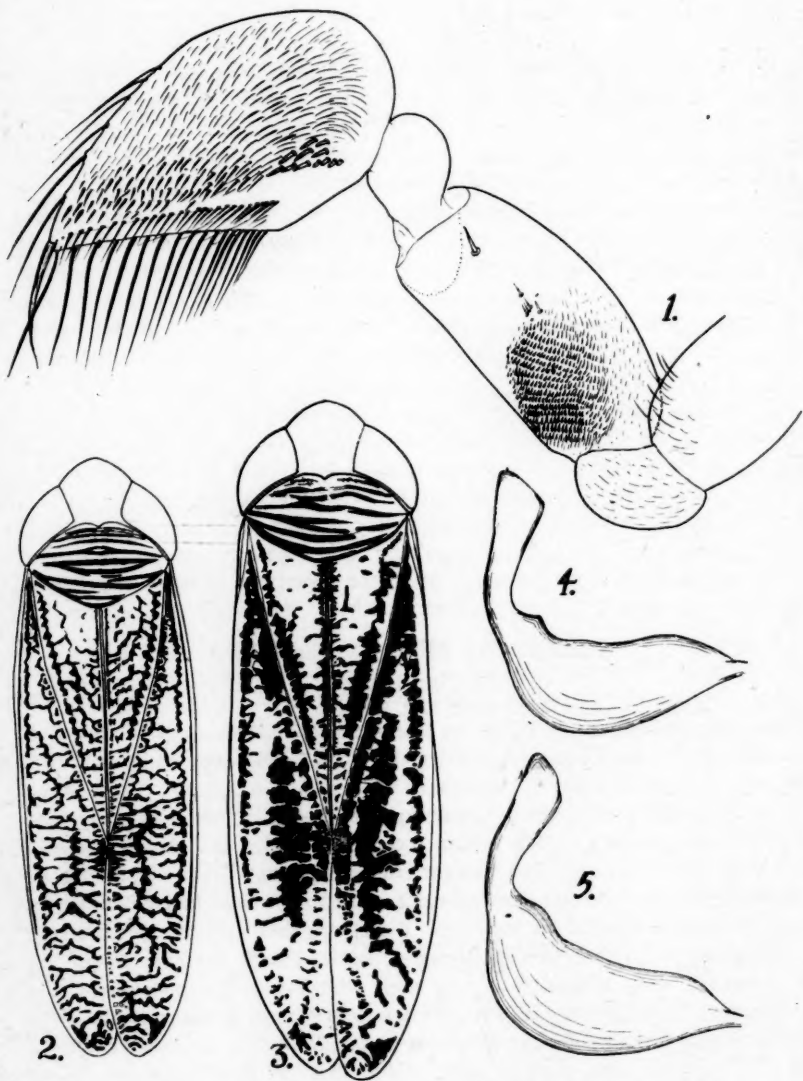
1. Male pala strongly compressed, lower edge straight, upper edge parabolic; palar pegs in two or three short rows confined to inner basal angle of pala (fig. 1) 2.
Male pala not strongly compressed, short, triangular or elongate with upper edge broadly arcuate; palar pegs in one or two rows extending to near apex of pala (figs. 6, 7) 3.
2. General aspect rather pale, black lineations of tegmina dispersed not massed to form heavy longitudinal blotches or stripes (fig. 2) *gillettii* Abb.
General aspect black and brown contrasted; black lineations massed to form an irregular black stripe on clavus parallel to claval suture, another at base of corium extending posteriorly on corium along claval suture and dividing near apex of clavus to invade disk of corium (fig. 3) *gillettii confluens* n. var.
3. Male pala short, triangular with pegs in two distinct rows, 4 large pegs along lower margin and 10 in a crescent shaped row above (Mexico) *mexicana* Hungfd.
Male pala elongate with more than 20 pegs in a single often crowded row (North Central, Eastern, U. S. and Canada) 4.
4. Male pala more than three times as long as broad; the adjacent tibial joint without small pegs; posterior margin of pronotum usually evenly rounded; tegmina with numerous fine black reticulations (figs. 6, 9) *buenoi* Abb.
Male pala two and one half times as long as broad; the adjacent tibial joint with a few small pegs; posterior margin of pronotum bluntly angulate at middle; tegmina with coarse black reticulations (figs. 7, 8) *nana* n. sp.

***Palmacorixa gillettii* Abbott.**

Pl. XI, figs. 1, 2, 4.

P. gillettii Abbott, Ent. News, XXII, 337, 1912. ill.

A male specimen of *gillettii* in the Bueno collection bears the label "Ft. Collins, Col., 5-22-00" also a red label bearing the single word Type and a pale blue label in Abbott's handwriting "*Palmacorixa gillettii* Abb. Cotype." This specimen is undoubtedly one of the original type series and is here designated the *Lectoholotype* of the species. The specimen conforms well with Abbott's diagnosis of the species. The illustrations are in general correct but a trifle diagrammatic; the stridular area on the male femur begins close to the base and extends only slightly beyond the middle not to the apex; the marginal cilia of the pala are considerably longer than shown and the tegmina slightly exceed the apex of the abdomen when the position is normal. A study of the type specimen and many other specimens at hand has failed to reveal a longitudinal division in the sixth abdominal tergite nor in the related species at hand has this character been observed. The arrangement of palar pegs and their number varies from two short well defined rows to a scattered group in which the row like arrangement is scarcely discernable. The terminal palar spine is present but scarcely differentiated from the remainder of the marginal cilia. In the series at hand the tegminal maculation varies somewhat. The type specimen resembles Dr. Abbott's illustration except that the black markings are slightly more irregular with the individual flecks



THE GENUS PALMACORIXA

1. Right front leg, *P. gillettii*. 2. dorsal aspect, *P. gillettii*. 3. dorsal aspect, *P. gillettii confluens* n. var. 4. right clasper of ♂, *P. gillettii*. 5. right clasper of ♂ para-type, *P. gillettii confluens* n. var.

more sharply defined. Numerous specimens from Missisquoi Bay, Lake Champlain, one of which is illustrated in figure 2 and also two specimens from Berrien County, Michigan, bear the same form of maculation as the type but the black marks are more heavily defined giving the specimens a slightly darker aspect than the type.

The males of *gillettii* are at once distinguished from all other species by the much dilated and flattened pala shown in figure 1. The lobes of the fourth abdominal tergite are a little shorter in *gillettii* than in *buenoi* and the strigil is noticeably larger in the former species. The male right clasper, while slightly variable has a more conspicuous lobe on its inner margin just beyond the middle than in *buenoi* and *nana*, further the section beyond the middle is broader and less neck-like than in *buenoi*. The pronotum is usually distinctly longer in proportion to its width than in *buenoi*. The color pattern of *gillettii* varies somewhat as noted above, but the black reticulations of the tegmina are always more dispersed, not tending to form a close network as in *buenoi*, and they are frequently entirely absent on the inner basal angle of the clavus. This gives the whole insect a distinctly paler aspect than either *buenoi* or *nana*. The vertex is paler with the longitudinal brownish streak distinct in *gillettii*.

Specimens examined: Ft. Collins, Colo., 5-22-00 ♂ type. Missisquoi Bay, Que.—series of both sexes taken by writer July 2, 1927. Kazubazua, Que.—♀ taken by writer, July 21, 1927—larger and darker than other specimens. Berrien Co. Mich., Sept. 1, 1919 (R. F. Hussey) det. as *gillettii* by Dr. Hussey.

***Palmacorixa gillettii confluens* n. var.**

Pl. XI, figs. 3, 5.

A series of ten males and five females of this well marked variety were collected by Dr. J. McDunnough in the Winnipeg River at Minaki, Ont. These specimens average about one mm. longer than typical *gillettii* and are slightly more robust, but otherwise appear structurally identical with *gillettii*. The color pattern is quite uniform with no tendency to grade into typical *gillettii*.

The ground color of the vertex, pronotum and tegmina is a rich yellowish brown (the vertex is sometimes purplish tinged) with the black pronotal bars and tegminal blotches sharply contrasting as in figure 3. The front legs, face and venter are paler yellowish. The slightly different right male clasper shown in figure 5 is that of a paratype; the series varies from this form to that of typical *gillettii* shown in figure 4.

Holotype.—♂, Minaki, Ont., July 4, 1928 (J. McDunnough); No. 3125 in the Canadian National Collection, Ottawa.

Allotype.—♀, same data as holotype.

Paratypes.—9 ♂ ♂, 4 ♀ ♀, Minaki, Ont., June 30-July 4, 1928 (J. McDunnough).

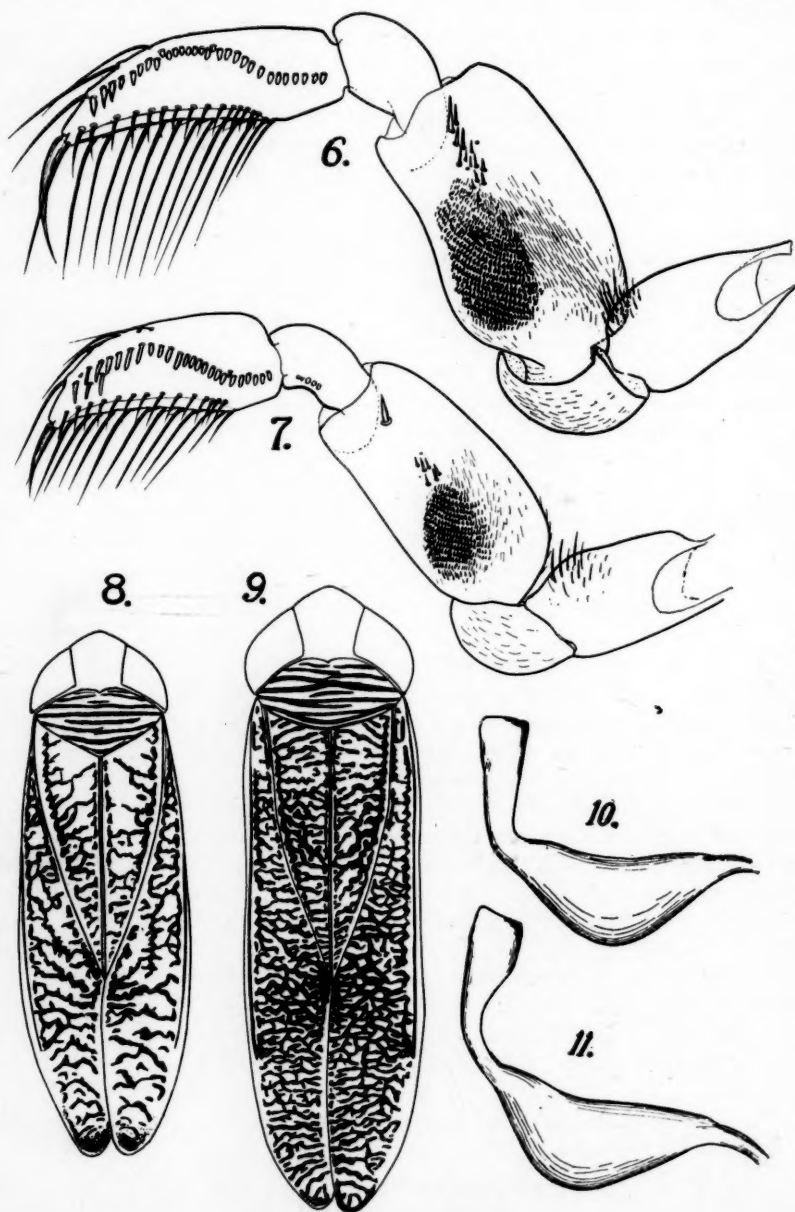
Paratypes in the Canadian National Collection and in the collection of Mr. J. R. de la Torre-Bueno, White Plains, N. Y.

***Palmacorixa buenoi* Abbott.**

Pl. XII, figs. 6, 9, 11.

P. buenoi Abbott, Can. Ent., XLV, 113, 1913.

The types of *buenoi* consist of two males and two females from White Plains, New York, collected in August and September by J. R. de la Torre-Bueno.



THE GENUS PALMACORIXA

6. Right front leg, *P. buenoi*. 7. right front leg, *P. nana* n. sp. 8. dorsal aspect, *P. nana* n. sp. 9. dorsal aspect, *P. buenoi*. 10. right clasper of holotype, *P. nana* n. sp. 11. right clasper, *P. buenoi*.

Other specimens before Dr. Abbott at the time of describing include the following localities: Washington, D. C. (coll. W. L. McAtee); Oglethorp, Georgia (coll. T. C. Bradley); Hadley, Mass. (coll. C. A. Frost) and Valhalla, N. Y. (coll. Bueno). The Bueno collection contains a part of this latter material and also a series of specimens collected subsequently at White Plains, N. Y. The species is not illustrated by Abbott but in 1919, Hungerford (Univ. Kan. Sci. Bul., XI, whole series XXI, No. 17) who studied the species at Ithaca, N. Y. gives figures of structural details and describes the immature stages with life history notes.

In commenting on the specimens before him Abbott remarks that "these individuals show a wide range of variation, such that the extremes would seem to belong to different species were it not for intergradation. The writer has been unable to find any constant character, however, which would serve as a basis for discrimination." He further proceeds to give various notes on the differences observed. These differences have been noted in part, by the present writer, in the Bueno collection material. A series of several hundred individuals collected in Southern Quebec by the writer are much more constant in color and size than the Abbott and Bueno specimens. Dr. Hungerford (loc. cit.) commenting on his Ithaca specimens notes two forms of constantly different size and also comments on structural variation in the males. The writer has been able to find only one species in the Bueno material at hand though several of the differences noted by Abbott are apparent.

The ground color in the series at hand varies from a pale yellow to a dark yellowish brown, the black pronotal cross lines vary in width and range from 4 to 8 sometimes entire, often broken or furcate. Figure 9 is typical of the Quebec series and represents an intermediate between the White Plains extremes. In the latter specimens there are individuals with a slightly more dispersed black pattern while in others the black pattern is intensified so that the darker lines at the middle of the clavus and corium are broadened to give the aspect of fuscous bars at these points.

Both sexes may be distinguished from *gillettii* by the darker aspect and more numerous tegminal lineations which invade the basal third of clavus. The males are readily distinguished by paler structure and the form of the right clasper. Females have the front femur two-thirds as wide as long in *gillettii* and two-fifths as wide as long in *buenoi*. The much denser and more regular color pattern, form of the male pala and stouter right clasper in the male will distinguish the species from *nana*.

Specimens examined: Bueno collection—White Plains, N. Y. ♀, 25-VII, 07 bears pencil label ex t. ser. and loc. ♀ 4-VII, 08, bears blue label in Abbott's hand "*Palmarcorixa buenoi* Abb. Cotypes," pinned on same label is a ♀, Valhalla, N. Y. 27-V-08. Other White Plains specimens—3 ♀ ♀, 26-V-09; ♀, 5-IX-10 (J. R. T. B.); 2 ♂ ♂, 18-V-19 (J. R. T. B.); 3 ♂ ♂, ♀, 29-V-20 (J. R. T. B.); ♀, 5-IX-21 (J. R. T. B.). V. Cortland N. Y. pk.—2 ♀ ♀, 18-IV-3, ♂, 6-VI-3. Ithaca, N. Y.—2 ♀ ♀, 18, Jul. 19. Staten Isl., N. Y.—♂, 16-V-3 Hadley, Mass.—14-V-10.

Canadian National Collection—Missisquoi Bay, Que., July 8, 1927; Brome Lake, Que., July 8, 1927, Knowlton's Ldg., Que., July 10, 1927; Fairy Lake, Que., Sept. 9, 1928. Black Rapids, Ont., Aug. 25, 1928; Minaki, Ont., July 3-4, 1928. Spirit Lake, Iowa, May 18, 1928.

***Palmacorixa nana* n. sp.**

Pl. XII, figs. 7, 8, 10.

Form and appearance of a small, dark specimen of *buenoi* but with distinctive color pattern and male palar and genital characters.

Length 4-5 mm. *Male*.—Vertex from above produced as in *buenoi*. Front with median oval depression small, slightly exceeding lower margin of eyes but distinctly narrower than greatest inter-ocular width. Carina of vertex weak, obsolete anteriorly. Disk of pronotum twice as broad as median length, without median carina, surface finely roughened but not rastrate and without impressed lines, posterior margin bluntly angulate at middle. Lateral lobe of prothorax and metaxyphus as described for genus. Front femora twice as long as broad, quadrangular with the rastrate area smaller than in *buenoi*. Front tibia with a row of four minute pegs near inner margin. Pala shorter and stouter than in *buenoi* with more slender pegs in a single slightly irregular row (fig. 7). Metathoracic wings vestigial. Tegmina dullish, finely roughened but not rastrate. Strigil formed as in *gillettii*, larger than in *buenoi*, 4-5 striae. Right clasper of male as in fig. 10.

Ground color yellowish brown, head suffused with brownish the median brown line on vertex only faintly visible. Venter of thorax and front legs paler yellowish; mid and hind legs and abdominal venter yellowish brown. Pronotum with about 7 slightly interrupted transverse black bars which are slightly narrower than the paler interspaces. Tegmina with an interlocking pattern of blackish flecks somewhat similar to *gillettii* but the flecks larger and coarser giving a darker aspect to tegmina (fig. 8). Embolium dirty yellowish with extreme margin brownish. Apex of tegmina brownish tinged.

Holotype.—♂, Kazubazua, Que., July 21, 1927 (G. S. Walley); No. 3126 in the Canadian National Collection, Ottawa. Male right front leg and genitalia on slide.

Allotype.—♀, same data as holotype.

Paratypes.—♂, 2 ♀, Kazubazua, Que., July 22, 1927 (G. S. Walley).

***Palmacorixa mexicana* Hungerford.**

P. mexicana Hungfd., Pan-Pac. Ent., IV, 94, 1927.

The writer has not studied this species which is known only from the two type specimens. The characters mentioned in the above key are taken from the original description of the species which also mentions the following distinctive characters: "Front depression on head of male large attaining the eyes laterally and surpassing them dorsally, Anterior femur of male incrassate, produced on inner base and bearing a large stridular area; tibia carinate on front side with white fleshy disc on distal end; The long anterior tibia and the short triangular pala with its peg arrangement somewhat resembles that of *A. mercenaria* (Say)."

THE LEPIDOPTERA OF THE NORTH SHORE OF THE GULF OF
ST. LAWRENCE.*BY J. MCDUNNOUGH,
Ottawa, Ont.

The following list is compiled from specimens collected by Mr. W. J. Brown in 1929; it should prove of interest to students of geographical distribution, containing, as it does, large elements of the Labrador fauna on the one hand and typical members of the Canadian and Hudsonian zones on the other. As far as I know Wm. Couper has been the only one who has published on the Lepidoptera of this region (Can. Ent., I, 67; IV, 201; VI, 33 *et seq.*) and his work has been confined largely to diurnals.

PIERIDAE

Pieris oleracea frigida Scud. 4 ♂, Bradore Bay, July 19, 27. From the rather worn condition of the specimens I should infer that the main flight was almost over at this date; the specimens appear to be identical with those from Hopedale, Labrador in our collections. Couper has discussed this species (*op. cit.*, VI, 56) at some length.

Eurymus interior Scud. 1 ♂, 3 ♀, Natashquan, Aug. 7, 10; 3 ♂, Trinity Bay, Aug. 20, 22. These all belong to the rather smaller form to which the name *laurentina* Scud. may be applied, if so desired. Reported by Couper from the same region.

Eurymus pelidne labradorensis Scud. 9 ♂, 1 ♀, Bradore Bay, July 21-27; 2 ♂ (worn), 2 ♀, Natashquan, Aug. 9. The latter locality probably represents about the most westerly point in the distribution of *pelidne* on the north shore; it overlaps here with *interior*.

SATYRIDAE

Coenonympha inornata Edw. 5 ♂, 1 ♀, Bradore Bay, July 19-27. None of the specimens show any traces of ocelli on either side and agree with Newfoundland specimens in our collections.

Oeneis polyxenes Fabr. 1 ♂, Little Mecatina Is., July 6; 1 ♂, 1 ♀, Bonne Esperance, July 14; 2 ♀, Old Fort Is., July 13; 1 ♂ (worn), Bradore Bay, July 25. I have already commented on the species from this region under the name *oeno* Bdv. (1921, Can. Ent., LIII, 82).

NYMPHALIDAE

Brenthis myrina atrostalis Huard. 3 ♂, Bradore Bay, July 24, 25, 27; 2 ♂, 1 ♀, Natashquan, Aug. 1, 5. The Bradore Bay specimens are much smaller than the Natashquan ones which are quite similar to those found in the south-western portion of Quebec province.

Brenthis aphirape triclalis Hbn. 5 ♂, 7 ♀, Bradore Bay, July 19-27.

Brenthis chariclea oenone Scud. 1 ♂, Bradore Bay, July 24. As the specimen is very fresh I presume that the flight of the species (which is the latest of the *Brenthis* to appear) was only commencing at this date.

Brenthis freija Thun. 1 ♂, 1 ♀, Mascanin, June 20; 1 ♂, Natashquan, June 21; 1 ♂, 2 ♀, Lake Is., June 28; 1 ♀, Little Mecatina Is., July 6. Considerable variation exists in these specimens in the amount of brown suffusion on the un-

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

derside of the hindwings, some of the specimens resembling in this respect the Labrador form which I have already commented on (1928, Can. Ent., LX, 274) as being a transition to *tarquinius* Curt.

Polygonia gracilis G. & R. 1 ♀, (hibernated), Mascanin, June 20.

Aglais antiopa L. 1 ♀, (hibernated), Mascanin, June 20.

LYCAENIDAE

Lycaena (Heodes) dorcas Kby. 1 ♂, Lake Is., June 28; 1 ♂, Natashquan, Aug. 1. The dates of capture are rather puzzling and would indicate, since both specimens are quite fresh, a very extended period of emergence. The specimens are both quite small in size, only slightly larger than *epixanthe*.

Lycaena (Heodes) epixanthe Bdv. and Lec. 4 ♂, Natashquan, Aug. 9. The specimens are rather small, but they are closer to the typical form, as figured by Boisduval and Leconte, than our series from Ottawa (Mer Bleue) and Covey Hill, Que.; the underside of secondaries shows a distinct pale yellowish tinge, not the dull whitish of these latter specimens.

Plebeius scudderi Edw. Natashquan, Aug. 1-9. A long series of both sexes in very fresh condition was obtained. The females vary considerably in the amount of blue suffusion on the upper surface and in the definiteness of the orange submarginal lunules. The average wing expanse is about 21 mm. but a few individuals of both sexes with an expanse of 24 mm. occurred.

Plebeius aquilo Bdv. 1 ♂, 2 ♀, Bradore Bay, July 17, 19, 22; 1 ♀, Bonne Espérance, July 14.

Glaucopsyche lygdamus couperi Grt. 1 ♂, Quarry Is., Mingan, June 13.

Lycaenopsis pseudargiolus lucia Kby. 3 ♀, Thunder Riv., June 10; 1 ♀, Quarry Is., Mingan, June 13; 3 ♂, 10 ♀, Mascanin, June 19, 20; 1 ♀, Lake Is., June 28; 1 ♀ (worn), Natashquan, Aug. 9. I believe it will be well to apply the name *lucia* in a racial sense to our northern and eastern Canadian race of *pseudargiolus* which is characterized by the heavy brown sprinkling on the underside of both wings and a more or less dark marginal band with often a brown discal suffusion on the secondaries; *marginata* Edw. is a true form of this with a very decided marginal band but no central dark scaling; all manner of intergrades between the two occur. *Lucia*, described from the region around The Pas, Manitoba, is one of the typical spruce-belt species like *Coenonympha inornata*, *Plebeius scudderi* and others, and its range more or less coincides across the continent with the limits of this belt; it is probably in most localities single brooded; in southern Ontario it gradually merges into typical *pseudargiolus* and its summer generation *neglecta* Edw.

ARCTIIDAE

Apantesis quenseli gelida Moesch. 1 ♂, Bradore Bay, July 17.

Arctia caja parva Roths. 1 ♀, Bradore Bay, July 27.

NOCTUIDAE

The representation in this family was very scanty and the list of species could probably be greatly increased by intensive collecting.

Euxoa quebecensis Sm. ? 1 ♀ (worn), Natashquan, Aug. 1.

Paradiarsia (Pachnobia) littoralis Pack. 3 ♂, Bradore Bay, July 22, 24.

Hemipachnobia monochromatea Morr. ? 1 ♀, Natashquan, Aug. 9.

Anarta melanopa Thun. 3 ♀, Lake Is., June 28; 1 ♂, 1 ♀, Harrington Harb., June 30, July 4.

Septis alia Gn. 1 ♂, Natashquan, Aug. 5.

Agroperina dubitans Wlk. 1 ♂ (worn), Natashquan, Aug. 10.

Agroperina lateritia Hfn. 1 ♂, Natashquan, Aug. 1.

Sidemia devastator Br. 1 ♀, Natashquan, Aug. 1.

GEOMETRIDAE

Mesothea incertata Wlk. ? 1 ♂ (very worn), Little Mecatina Is., July 6.

Cosymbia pendulinaria Gn. 1 ♀, Thunder Riv., June 10. The specimen evidently belongs to the spring brood and is almost as dark as the variety *griseor* McD., based on western material.

Carsia paludata labradorensis Som. 1 ♂, Natashquan, Aug. 9. The specimen is very rubbed but, as far as can be told, agrees with the Labrador series in our collections.

Nyctobia limitaria Wlk. 1 ♂, Seven Is., June 8.

Calocalpe undulata Linn. 1 ♀, Natashquan, Aug. 9.

Xanthorhoe munitata Hbn. 1 ♂, Bradore Bay, July 26.

Xanthorhoe ferrugata Cl. 1 ♀, Tabatiere, July 11.

Xanthorhoe algidata Moesch. 2 ♂, Bradore Bay, July 19, 21.

Xanthorhoe iduata Gn. 1 ♀, Natashquan, Aug. 1.

Xanthorhoe abrasaria congregata Wlk. 2 ♂, Natashquan, Aug. 1, 9.

Orthonama obstipata Fabr. 1 ♂, Natashquan, Que., Aug. 9.

Eulype hastata Linn. In a long series from Harrington Harb., (June 30-July 4) and Mecatina Is., (July 6) the individuals are typical *hastata*; a single female from Natashquan, Aug. 1 belongs to the form *gothicata* Gn., but is much smaller than Ottawa specimens. There is also a second very worn female taken at the same place and on the same date which is larger and belongs to typical *hastata*; a study of these two so-called forms and their distribution might produce interesting results.

Eupithecia satyrata Hbn. 1 ♂, Mecatina Sanctuary, July 8. In this genus I have checked up all determinations by genitalic slides.

Eupithecia russeliata Swett. 1 ♂, Mutton Bay, July 11. Agrees with our Ottawa and Kazubazua specimens in being rather grayer and better marked than specimens from New England States but shows no genitalic differences.

Eupithecia gelidata Moesch. 1 ♂, 1 ♀, Mecatina Sanctuary, July 9; 1 ♀, Net Is., July 12. The receipt of these specimens from the same general region as the type of *gelidata* tends to confirm my opinion on the synonymy expressed in the Canadian Entomologist, LXI, 66, 1929. The genitalia of my male specimen agrees excellently with Petersen's figure of the male genitalia of *hyperboreata* Staud. (1909, Iris, Pl. XXII, f. 90) and a comparison between the figure I present herewith of the Bursa copulatrix of the Mecatina female and Petersen's of the same organ in *hyperboreata* shows clearly that the two are identical.

Eupithecia nimbicolor Hlst. 1 ♀, Thunder River, June 10. It is not surprising that this species is found to occur in the east as well as in the Rocky Mt. region of Alberta and adjacent territory; most of our so-called western species in the genus have now been shown to extend in distribution across the entire continent. The present specimen is rather more clearly marked than most speci-

mens of our long series from Calgary and Nordegg, Alta. and shows none of the brownish tinges characteristic of the majority of Albertan specimens; it has however the same narrow, pointed primaries and the form of the Bursa copulatrix (which I figure) clearly throws it into *nimbicolor*: possibly with more material available it may prove to be worthy of a racial name. The characteristic features of the Bursa are—(1) the Ductus seminalis arising on the right hand side (left in figure) from near base of sack and armed at origin with a few strong spines; (2) a patch of strong spines on dorsal surface of sack near base; (3) the very strong marginal spines in the spined area of the Fundus which area extends completely around the sack with the exception of a very narrow unspined band extending down the left side but scarcely attaining the apex of sack and not nearly so prominent as in *satyrata*. It might be well to point out that in specimens where the Bursa is very strongly distended the orifice of the Ductus seminalis and the dorsal spine-patch appear to be closer to the base of the sack than in the specimen figured; such apparent differences, due to the very variable amount of inflation in the sacks as dissected out of the female abdomen, are liable to cause considerable confusion in identifications until this unavoidable feature is recognized. Too great stress cannot apparently be laid on the number of spines in the dorsal spine-patch as, judging by the seven or eight slides before me, this is rather variable and seemingly an individual variation rather than a racial one.

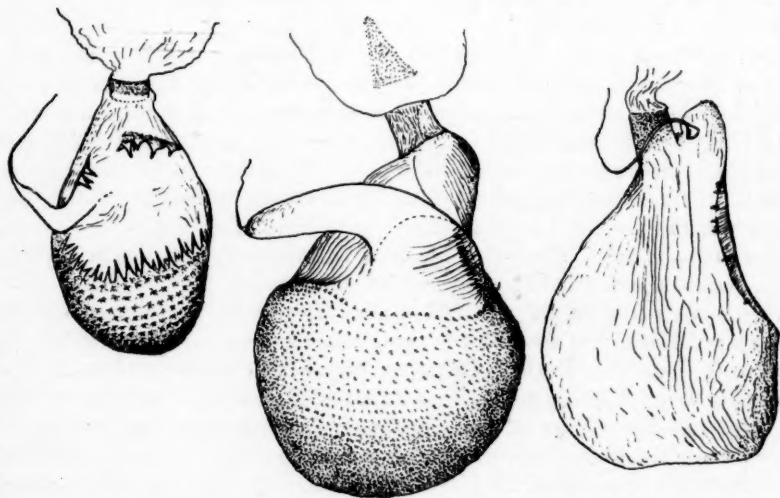


Fig. 1. Bursa copulatrix of (a) *Eupithecia nimbicolor* Hlst., (b) *E. gelidata* Moesch., (c) *E. bradorata* n. sp.

***Eupithecia bradorata* n. sp.**

Female. Rather contrasted in general appearance of primaries and somewhat reminiscent of *E. perbrunneata* Tayl. in this respect.

Palpi moderate, smoky brown laterally; front whitish with a brown transverse line anterior to antennae; thorax mixed whitish and smoky. Primaries with whitish ground color with numerous smoky patches and lines; extreme

base of wing smoky; following this along costa are four equidistant brown patches, the first rather indistinct, subtriangular; the second prominent, irregularly rectangular, its outer margin angled outwardly to touch discal dash; the third narrow; the fourth subapical, and much broader than deep, separated from the dull smoky apex of wing by a narrow white area. The second dark patch gives rise to a narrow dull antemedian smoky band with irregular outer margin, and containing small darker patches at base of vein 2 and at inner margin, inwardly this antemedian band is bordered by a dull whitish band containing traces of a broken dark line but the whole area between it and the base of wing is not sharply marked and presents a general diffused appearance. Discal dash linear, black, well-defined. T. p. line arising from third costal patch, bent outwardly opposite cell, then gently crenulate with slight inward angles on vein 2 and vein 1, accentuated on all veins by slightly darker short streaks. Median and postmedian areas largely whitish, a streak of this color extending across the subterminal area below the fourth costal patch almost to margin of wing. Subterminal and terminal areas largely smoky, separated by a faint whitish s. t. line which forms prominent white blotches between veins 3 and 4 and above inner angle. A broken dark terminal line. Fringes smoky, indistinctly checkered.

Secondaries dirty white with smoky shading at base, a distinct discal dash, followed by a curved, crenulate, smoky line, best defined in inner half of wing; a broad pale smoky terminal shade, containing several white dots near inner angle where it forms a more decided dark blotch. Fringes checkered.

Beneath whitish, both wings with distinct discal streaks and traces of a pale smoky basal area, t. p. line and subterminal band, broadest at costa; terminal area distinctly pale; fringes checkered. Expanse 16 mm.

Holotype.—♀, Bradore Bay, July 26, (W. J. Brown); No. 3142 in the Canadian National Collection, Ottawa.

I should have hesitated to describe the species as new if it had not been for the very distinctive *Bursa copulatrix* of which I present a figure; the *Ductus seminalis* is very narrow and arises dorsally from the base close to the *Ostium*; the sack is without armature with the exception of a narrow band of thin chitin on the left side which contains a few minute spinules; the membrane is colorless but contains numerous faint longitudinal streaks. No illustration of Petersen's at all resembles this type of *Bursa* and among our North American species the nearest approach to it is found (as far as I know) in *kasloata* Dyar (*vide* Can. Ent., LXI, 63, 1929). My specimen was not very well inflated and the outline of the sack may be somewhat different in better inflated bursae, but the details should be readily recognizable.

Isturgia truncataria Wlk. 2♂, Thunder Riv., June 10; 2♂, Mascanin, June 19, 20.

Eufidonia discospilata Wlk. 1♂, Natashquan, June 21; 1♂, Old Fort Is., July 13. *Discospilata* is a distinct species from *notataria* Wlk. as pointed out by Morrison when he redescribed it as *quadripunctata* and compared it with *bicoloraria* Minot which is a form of *notataria*; the male genitalia of the two show decided differences. *Notataria (fidoniata)* is the larger species with generally much less maculate secondaries, especially as regards the subterminal blotches;

I have a notion its larva is a pine feeder whereas that of *discospilata* probably feeds on *Vaccinium* and related plants.

Macaria sexpunctata Pack. 2♂, Natashquan, Aug. 9.

Macaria dispuncta Wlk. ? 1♂, Natashquan, Aug. 1. The specimen is small but I place it here rather than with *sexpunctata* on account of its more variegated appearance. While I am reasonably certain that *sexpunctata* and *dispuncta* (which may or may not be a form of *granitata*) are distinct species they are sometimes very awkward to separate; the larva of the former is mottled gray-brown and is a larch-feeder whilst that of the latter is the well-known hemlock and spruce-feeder, bright green with a broad lateral white stripe.

Aspilates orciferaria Wlk. 3♂, Bradore Bay, July 25. Mr. L. B. Prout has recently called my attention to the fact that the inclusion of the name *labradoriata* Moesch, as a variety of this species in both Dyar's Catalogue and the Barnes and McDunnough Check List is an error, originally caused by some extraordinary misidentification by Hulst; the only *labradoriata* to be credited to Moeschler is that which has been listed as a synonym of *Macaria sexpunctata* Pack. Typical *orciferaria* occurs in the Arctic regions and should a name be desired for the somewhat lighter form from Labrador and adjacent regions Mr. Prout has pointed out that *conspersaria* Stgr. (1901, Stgr. & Rebel, Cat. Lep. Pal., I, 357) is available. It will further be necessary to examine the types of both *aberrata* Hy. Edw. and *taylori* Butl. before the correct synonymy of this species can be established.

PYRALIDAE

Pyraustinae

Nomophila noctuella D. & S. 1♂, Natashquan, Aug. 9.

Phlyctaenia inquinatalis Zell. 3♂, Bonne Esperance, July 14; 7♂, 5♀, Bradore Bay, July 19-26.

Phlyctaenia tertialis Gn. 1♀, Bradore Bay, July 21.

Pyrausta fodinalis Led. 2♂, 4♀, Natashquan, Aug. 1, 9.

Pyrausta borealis Pack. 1♀, Bradore Bay, July 17.

Scopariinae

Scoparia centuriella D. & S. Seventeen specimens from Bonne Esperance, July 14; Bradore Bay, July 17-26; Natashquan, Aug. 9, 10.

Scoparia lugubralis Wlk. 1♀, Mutton Bay, July 11; 1♀, Natashquan, Aug. 1; 2♀, Trinity Bay, Aug. 17. The two first-mentioned specimens are very large and dark and correspond fairly well with a paratype of Dyar's recently described species, *phycitinalis*, (1929, Proc. U. S. N. M., LXXIV (24) 4); the Trinity Bay specimens are smaller and paler and agree closely with our series from Alberta and British Columbia. Dyar's so-called revision has merely added to the confusion of nomenclature in this at the best most perplexing group, so that until a very careful study of types and structural details of genitalia has been made all determinations must remain more or less tentative.

Scoparia basalis Wlk. 1♂, Natashquan, Aug. 10. The specimen is rather unicolorous dull fawn-brown with indistinct maculation; I place it here since the genitalia show a distinct spine on the ventral edge of the clasper; this spine is not present in the species which I call *lugubralis* but which Dyar has determined as

nominatalis Hlst. *Basalis* evidently belongs in what Chapman (1911, Trans. Ent. Soc. Lond. 501/16) terms the "root-feeding" section of *Scoparia*.

Crambinae

Crambus pascuellus Linn. 1 ♂, Harrington Harb., July 3; 1 ♀, Little Mecatina Is., July 6; 1 ♀, Mecatina Sanctuary, July 8; 2 ♂, Tabatière, July 11; 1 ♂, 1 ♀, Net Is., July 12; 2 ♂, 1 ♀, Bradore Bay, July 19, 21, 23; 1 ♂, 1 ♀, Natashquan, Aug. 1.

Crambus dumetellus Hbn. 3 ♂, Bradore Bay, July 27; 1 ♀, Natashquan, Aug. 1.

Crambus myellus Hbn. 1 ♂, Bradore Bay, July 27.

Crambus hortuellus Hbn. 4 ♂; 1 ♀, Natashquan, Aug. 1. The specimens are quite small and pale.

Crambus ruricollellus Zell. 2 ♂, Natashquan, Aug. 10.

Phycitinae

Laodamia fusca Haw. 1 ♀, Bradore Bay, Aug. 27. This locality is only a few miles distant from the type locality of *frigidella* Pack. which Ragonot has listed as a race of *fusca*, based on considerably grayer specimens from Greenland and Iceland. I can see no difference in color between the Bradore Bay specimen and the long series in our collections from localities extending across the Dominion as far as the Rocky Mts. Should our North American form prove sufficiently distinct from the European one to warrant a name, it would seem that *moestella* Wlk. would be the correct one to use.

Anerastiinae

Anerastia (Prinanerastia) lobella Hbn. 1 ♂, Natashquan, Aug. 10. This common European species has, as far as I know, not been recorded from North America. Besides the above-mentioned specimen, there is a very long series before me from Aweme, Man., very variable in color. I have not had a chance to compare these with actual European specimens, but they fit in very closely with such colored figures as I have seen and agree structurally with Hampson's characterization (1918, Proc. Zool. Soc. Lond., 80).

PTEROPHORIDAE

Oidaematophorus stramineus Wlsh. 1 ♂, Bradore Bay, July 23. Rather worn but agrees genitally with our other specimens.

GELECHIIDAE

Telphusa quinquecristatella Cham. 1 ♂, 1 ♀, Lake Is., June 28; 1 ♀, Fog Is. Sanctuary, June 25.

Telphusa belangerella Cham. ? 1 ♂, Harrington Harb., July 2; 1 ♀, Mecatina Sanctuary, July 8. Doubtfully determined by Mr. A. Busck.

Gelechia continuella Zell. 1 ♂, Bradore Bay, July 17.

Several other *Gelechia* and *Gnorimoschema* species were represented in the collection but I have been unable to obtain determinations for them and cannot risk describing as new in the present confused state of the group.

EUCOSMIDAE

Bactra furfurana Haw. 4 ♂, Natashquan, Aug. 10.

Endothenia hebesana Wlk. 2 ♀, Natashquan, Aug. 9.

Zomaria interruptoliniana Fern. 1 ♀, Natashquan, Aug. 9. This record extends the northern distribution of the species considerably; it is not mentioned

in Winn's Quebec List but we have taken it at Kazubazua, Que. on the Gatineau River.

Aphania frigidana Pack. 1 ♂, Bonne Esperance, July 14.

Argyroploce sordidana McD. 6 ♂, Bradore Bay, July 17-27. This is the first time that the species has been collected since I described it from material from Nordegg, Alta. The present specimens are slightly smaller than the types but agree in genitalia; they show considerable variation in the distinctness of the banding and one specimen has a decided olive-green tinge instead of the usual deep brown color.

Argyroploce puncticostana var. *murina* Pack. A very long and practically topotypical series from Bradore Bay, July 19-26, leads me to the belief that Packard's name might with advantage be used in a varietal sense rather than sunk as a straight synonym. The series before me is quite variable, the ground color of primaries ranging from deep olive-green to rather bright cinnamon-brown. A very small proportion of the specimens shows fairly well defined banding but never as distinct as in the type form: in the great majority, however, the pale bands are obsolescent or entirely absent, although generally there are traces of metallic dots in the postmedian area. This more or less unicolorous form was evidently what Packard had before him when describing *murina*, judging by a photograph of the type before me, and has developed in this region to a fairly constant geographical race.

Argyroploce carolana McD. 2 ♂, Natashquan, Aug. 1, 10. The specimens are darker than my type male and the patagia do not show the white tips but the genitalia are similar. Apart from the type series the only other record I know of for this species in a single female, taken by myself at Waterton Lakes, Alta, in 1923.

Argyroploce glaciana Moesch. 8 ♂, Bradore Bay, July 23-27; 5 ♂, Natashquan, Aug. 1, 9. Apart from the genitalia the general duller color of the maculation of primaries separates this species from the preceding.

Argyroploce bipartitana Clem. 10 ♂, 1 ♀, Bradore, July 19-26; 4 ♂, Natashquan, Aug. 1, 9.

Argyroploce intermistana Clem. 3 ♂, Bradore Bay, July 17-27; 1 ♂, Net Is., July 12; 1 ♂, Natashquan, Aug. 1. All these specimens are very contrastingly maculate on the primaries, resembling considerably a small *schulziana* and corresponding well with a paratype of *tessellana* Pack. in our collection. Other specimens before me from Hopedale, Labrador, are almost unicolorous dull gray or smoky brown and would hardly be recognized as the same species were it not for the similar genitalia.

Argyroploce schulziana Fabr. 1 ♂, Little Mecatina Is., July 6; 3 ♂, Mutton Bay, July 11; 1 ♂, Net Is., July 12; 1 ♂, Old Fort Bay, July 13; 3 ♂, Bonne Esperance, July 14; 17 ♂, 8 ♀, Bradore Bay, July 17-26. One of the commonest species on the eastern section of the coast. The color of the forewings varies from brown to olive-green, and in maculation hardly any two specimens are exactly alike; the large size and the round white dot on the outer edge of the dark median band at end of cell render the species readily distinguishable.

Argyroploce fulvifrontana Pack. 1 ♂, Bonne Esperance, July 14, 7 ♂, 2 ♀,

Bradore Bay, July 17-24. I use Packard's name in preference to *septentrionana* Curt. as there is considerable doubt about the synonymy of the species, as pointed out by Heinrich in his revision. The specimens before me are almost topotypical material and undoubtedly *fulvifrontana*; I might note that in the males the fulvous scaling of the front is not so well developed as in the females, at times being practically lacking. As to *septentrionana* I should think there would be much more likelihood of its proving to be a rather worn, dark form of what we are calling *mengelana* Fern. than of being synonymous with *fulvifrontana*. We have a small series from Baffin Land and surrounding territory, some specimens of which match Curtis' description fairly well as they lack nearly all trace of the pale gray scaling; Curtis' reference to his species being somewhat similar to *hybridana* Hbn. would also point in this direction. Of the other name in the present synonymy, *primariana* Wlk., I know nothing further than what Heinrich notes.

Rhopobota geminana Steph. 1 ♂, Trinity Bay, Aug. 18. Heinrich sinks our *Vaccinium*-feeder to *naevana* Hbn., a holly-feeder, but I follow British authors in keeping the two distinct and using the name *geminana* with *vacciniana* Pack. and *luctiferana* Wlk. as synonyms for the present. The single specimen before me is larger and greyer than my series of bred specimens from East Wareham, Mass., but without more material further comment is impossible.

Epinotia rectiplicana Wlsh. 8 ♂, Mecatina Sanctuary, July 8; 2 ♀, Mutton Bay, July 11. Somewhat darker than our British Columbia specimens but apparently similar in male genitalia and agreeing well with a series from Kazubazua, Que.

Epinotia sollicitana Wlk. 2 ♂, 6 ♀, Bradore Bay, July 21. Darker than our eastern Ontario specimens but very similar to ones from Aweme, Man. and Nordegg, Alta.

Epinotia corylana McD. 1 ♂, Natashquan, Aug. 10. A very worn specimen which belongs here according to genitalia.

Epinotia transmissana Wlk. 1 ♀, Bradore Bay, July 21.

Anchylopera subaequana Zell. 1 ♂, Fog Is. Sanctuary, June 25; 8 ♂, Harrington Harb., June 30, July 2, 4; 1 ♂, 2 ♀, Little Mecatina Is., July 6; 1 ♂, 1 ♀, Mecatina Sanctuary, July 8; 3 ♂, Mutton Bay, July 11; 1 ♂, Natashquan, Aug 7. There is considerable variation in the above series not only in size but also in the shape and depth of color of the dark basal patch on primaries as well as the distinctness of the maculation in the outer portion of the wing.

Ancylis comptana Froel. 1 ♂, Harrington Harb., July 3.

Ancylis carbonana Heinr. 1 ♂, Mascanin, June 20; 1 ♀, Harrington Harb., July 2.

Ancylis unguicella Linn. (*plagosana* Clem.). A long series of both sexes from Harrington Harb., June 30-July 3 and various points between this and Bradore Bay, July 17-24.

Ancylis tineana Hbn. 4 ♂, 1 ♀, Fog Is., June 25; 2 ♂, Lake Is., June 28; 3 ♂, 2 ♀, Mecatina, July 8; 8 ♂, Harrington Harb., June 30-July 4; 1 ♂, Bradore Bay, July 23.

***Dichrorampha dana* var. *bradorensis* n. var.**

Male. Differs from the typical form as it occurs around Ottawa by the much greater suffusion of pale olive-gray scaling on the outer one-half to two-

thirds of primaries. This scaling largely or entirely hides the metallic banding and also the black oblique costal bands and the dots along outer margin so that to the naked eye the primaries appear unicolorous olive-gray. Under a lens the maculation may be traced and is the same as in the typical form.

Holotype.—♂, Bradore Bay, July 27, (W. J. Brown); No. 3141 in the Canadian National Collection, Ottawa.

Paratypes.—5 ♂, same data.

Hemimene bowmanana McD. 1 ♀, Mutton Bay, July 11. This specimen has the whitish bars on the middle of the inner margin better developed than in the type series but the genitalia agree. I figure the female genitalia as this was not done at the time of description.



Fig. 2. Female genitalia of *Hemimene bowmanana* McD.

TORTRICIDAE

Sparganothis violaceana Rob. 1 ♂, Bradore Bay, July 23.

Cacoecia arcticana Moesch. 1 ♂, 1 ♀, Bradore Bay, July 21, 26.

Tortrix peritana Clem. 1 ♂, Natashquan, Aug. 10.

Eulia pinatubana Kft. ? 1 ♀, Fog Is., June 25.

Cnephasia osseana Scop. 1 ♂, Bradore Bay, July 21; 1 ♂, Natashquan, Aug.

1. These are typical *osseana* and not *niveosana* Pack. which is a much grayer species with darker hindwings and probably a good species or at least race.

PHALONIIDAE

Phalonia albidana Wlk. 2 ♂, Harrington Harb., July 2, 4; 1 ♀, Little Mecatina Is., July; 1 ♀, Mecatina Sanctuary, July 8; 1 ♀, Mutton Bay, July 11.

HELIODINIDAE

Schreckensteinia festaliella Hbn. A long series from Bragg Harb., Musquaro Township, June 24, and Fog Is. Sanctuary, June 25.

GLYPHIPTERYGIDAE

Choreutis coloradella Kft. ? 1 ♂, Bradore Bay, July 21. Mr. Busck states that while the specimen agrees fairly well with the Alaskan paratype of this species, he is in some doubt as to whether the two specimens are conspecific with the Colorado type.

PLUTELLIDAE

Plutella porrectella L. 1 ♂, Bradore Bay, July 21. A rather large, well marked form.

YPONOMEUTIDAE

Argyresthia monochromella Bsk. ? 1 ♀, Bradore Bay, July 25; 1 ♂ (worn) Natashquan, Aug. 1. Mr. Busck, who examined the specimens, cannot separate them superficially from his type of this species, heretofore known only from British Columbia.

HAPLOPTILIIDAE

Two species of the genus *Haploptilia* were taken at Bradore Bay, but Mr. C. Heinrich is unable to determine them at present without further biological data.

GRACILARIIDAE

Gracilaria anthobaphes Meyr. 1 ♀, Harrington Harb., July 3; 2 ♂, Mecatina Sanctuary, July 8.

Parornix boreasella Clem. ? 1 ♂, Fog Is. Sanctuary, June 25; 1 ♂, Little Mecatina Is., July 6. The Fog Is. specimen agrees quite well with the description which was based on one of Packard's Labrador specimens probably collected in the same general locality.

SCYTHRIDIDAE

Scythris norisella Zell. (*magnatella* Bsk.). 2 ♂, 3 ♀, Trinity Bay, Aug. 17, 18. The synonymy is supplied by Mr. A. Busck.

TINEIDAE

Monopis biflavimaculella Clem. 3 ♀, Natashquan, Aug. 10.

BOOK NOTICES.

A Handbook of the Mosquitoes of North America—Their structure; How they live; How they carry disease; How they may be studied; How they may be controlled; How they may be identified—By Robert Matheson, Professor of Entomology, Cornell University; Charles C. Thomas, Publisher, Springfield, Illinois—Baltimore, Maryland; price, \$5.50 post paid.

This volume of 268 pages recently came to hand. The author points out that the object of the Handbook is to present as concise an account as possible of the species of mosquitoes occurring in North America, to summarize their life-histories, habits, breeding habitats, their relation to our own welfare, and to discuss the problem involved in any attempt at their reduction. The volume is divided into seven chapters. Chapter I discusses the characteristics of mosquitoes; II, The Biology of Mosquitoes; III, Mosquitoes in Relation to Human Welfare; IV, The problem of Mosquito Reduction; V, How to Study, collect, rear and preserve mosquitoes; and VI and VII, systematic accounts of North American mosquitoes. Twenty-five plates are included in the volume, illustrating breeding areas, structural details, various types of larvae, etc. In addition, twenty-three figures appear in the text. The book is well printed and the subject matter presented in an interesting and instructive manner. The volume should certainly be of value, not only to entomologists, medical men and others, but also to all citizens who take an interest in public health matters.

ARTHUR GIBSON.

Les Insectes Nuisibles de la Province de Québec.

There has recently come to my desk an interesting and instructive volume of 244 pages entitled "Les Insectes Nuisibles de la Province de Québec." The

authors of the volume are Messrs. Germain Beaulieu and Georges Maheux.

This book which is printed in French, should not only be of value to farmers, fruit growers and others in the province of Quebec who are in need of information regarding the control of important insect pests, but it should also be welcomed by teachers, students and nature lovers who desire reliable information regarding the life-history and habits of many species of insects.

The volume is divided into XI chapters as follows:

I General Information on Insects. II Insects Injurious to Gardens. III Insects Injurious to Field Crops. IV Insects Injurious to Fruit Trees. V Insects Injurious to Bush Fruits. VI Insects Injurious to Forest and Shade Trees. VII Insects Injurious to Flowers. VIII Injurious Household insects. IX Live Stock Insects. X Insect Enemies. XI Insecticides.

The book is well printed; the type used is good and easy to read; in all there are 116 illustrations. The volume should be well received and should go a long way in directing attention to the importance of a knowledge of insect pests. The price of the volume is \$1.50. Copies may be had on application to Prof. Georges Maheux, Parliament Buildings, Quebec; Published by Charrier & Dugal Ltd., Quebec, Canada.

A. G.

MAILED, MONDAY, JUNE 2ND, 1930.

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